

CLAIMS

1. An air conditioning system comprising a compressor into which a first air is introduced, a heat exchanger into which the first air compressed by the
5 compressor is introduced, and an expander into which the first air heat-exchanged by the heat exchanger is introduced and which is connected with the compressor through a connection mechanism, the air conditioning system further comprising a dehumidifier therewithin,
10 wherein moisture content of a dehumidifying agent in the dehumidifier is decreased by a second air heat-exchanged with the first air by the heat exchanger.

2. The air conditioning system according to Claim 1, wherein the first air dehumidified by the dehumidifier is
15 introduced into the compressor.

3. An air conditioning system comprising a compressor into which a first air is introduced, a heat exchanger into which the first air compressed by the compressor is introduced, and an expander into which the
20 first air heat-exchanged by the heat exchanger is introduced and which is connected with the compressor through a connection mechanism, the air conditioning system further comprising a dehumidifier therewithin, wherein an air having a temperature lower than the
25 temperature of the first air is mixed with the first air before the first air is introduced into the compressor.

4. The air conditioning system according to Claim 3,

wherein the first air dehumidified by the dehumidifier is introduced into the compressor.

5 5. The air conditioning system according to Claim 3 or 4, wherein the air having a lower temperature is introduced from a space to be air-conditioned by the air conditioning system.

10 6. An air conditioning system comprising a compressor into which a first air is introduced, a heat exchanger into which the first air compressed by the compressor is introduced, and an expander into which the first air heat-exchanged by the heat exchanger is introduced and which is connected with the compressor through a connection mechanism, the air conditioning system further comprising a dehumidifier therewithin and
15 a selector valve for selectively introducing into a space to be air-conditioned either a second air heat-exchanged with the first air by the heat exchanger or the first air exhausted from the expander.

20 7. The air conditioning system according to Claim 6, wherein the first air dehumidified by the dehumidifier is introduced into the compressor.

25 8. The air conditioning system according to Claim 6 or 7, wherein the second air is one that has been introduced into the dehumidifier and decreased moisture content of a dehumidifying agent.

9. An air conditioning system comprising a first compressor into which a first air is introduced, a first

heat exchanger into which the first air compressed by the first compressor is introduced, and a first expander into which the first air heat-exchanged by the first heat exchanger is introduced and which is connected with the first compressor through a connection mechanism, the air conditioning system further comprising a second compressor into which a third air is introduced, a second heat exchanger into which the third air compressed by the second compressor is introduced, a second expander into which the third air heat-exchanged by the second heat exchanger is introduced and which is connected with the second compressor through a connection mechanism, first and second dehumidifying freezers, into which the first air expanded by the first expander and the third air expanded by the second expander may be introduced, and which are configured to be capable of mixing the first air and the third air to solidify moisture content contained in the air mixed, and a selector valve for enabling either one of the first and second dehumidifying freezers to operate.

10. The air conditioning system according to Claim 9, wherein heat generated in the air conditioning system is utilized to thaw moisture content solidified in one of the dehumidifying freezers that is not in operation.

11. The air conditioning system according to Claim 10, wherein the heat is from a second air heat-

exchanged with the first air by the first heat exchanger or from an air heat-exchanged with the third air by the second heat exchanger.

12. The air conditioning system according to any
5 one of Claims 9 to 11, further comprising a dehumidifier therewithin, wherein moisture content of a dehumidifying agent in the dehumidifier is decreased by the second air heat-exchanged with the first air by the first heat exchanger.

10 13. The air conditioning system according to any one of Claims 9 to 12, wherein the first air dehumidified by the dehumidifier is introduced into the compressor.

14. The air conditioning system according to any one of Claims 1 to 13, wherein the connection mechanism
15 comprises a stator in common to the compressor and the expander, a first shaft inserted into the stator through the compressor, and a second shaft inserted into the stator through the expander, capable of rotating at a rotation speed different from that of the first shaft.

20 15. The air conditioning system according to Claim 14, wherein at least part of electric power generated at the stator by rotation of the second shaft is supplied to the stator for rotation of the first shaft.

25 16. The air conditioning system according to any of Claims 1 to 13, comprising at least two of the compressor, wherein the connection mechanism is configured in such a manner that one of the compressors

rotates at the same revolution with the expander.

17. The air conditioning system according to any one of Claims 1 to 16, wherein the heat exchanger contains an intermediate medium whose flow rate is
5 controllable.

18. An air conditioning system comprising an air conditioning mechanism comprising a compressor into which a first air is introduced, a heat exchanger into which the first air compressed by the compressor is introduced,
10 and an expander into which the first air heat-exchanged by the heat exchanger is introduced and which is connected with the compressor through a connection mechanism, the air conditioning system further comprising a dehumidifier therewithin and means for supplying
15 dehumidified air to at least one of at least two compartments, in which airs being different at least in temperature or humidity are exchanged, of an air-conditioned room to which the air conditioning system is applied.

20 19. The air conditioning system according to Claim 18, wherein the first air dehumidified by the dehumidifier is introduced into the compressor.